

The Truth about IonLife and Emco Tech (Jupiter Science) Ionizers

Scope and Purpose

It is an unfortunate fact that there is a significant amount of misinformation being promulgated by competing ionizer companies and their representatives. The purpose of this document is to present accurate information about electrode/plating technology and manufacturing processes, show some examples that visually illustrate the information and provide some substantive test results to back it up.

It is very important to point out the fact that the misinformation floating around is totally absent of any technical or scientific substantiation or test results. It shows up across a broad spectrum of topics ranging from technical issues to product certifications, to marketing techniques. In many cases this information can be proven wrong or technically incorrect with even a minor amount of simple research. Certain examples are a direct and intentional attempt to create an unwarranted “fear” to gain a selling advantage in the marketplace for an ionizer that is massively over-priced. This document will cover only some of the more egregious technical issues. We can only hope that as you read the information you will come to your own conclusion that this “fear based” approach has been misleading, aggressive and clearly motivated by forces other than fact, plus is put out by those with no training in water technology. This should more than reasonably cast a distinct shadow of doubt over everything else that other companies may assert in their over zealous and negative marketing efforts.

Titanium Leaching

The most inaccurate and damaging statements made are regarding leaching of titanium. It is asserted that Emco Tech sprays platinum on a solid titanium plate > then stamps a mesh grid into the plate > leaving “exposed edges” then ergo: titanium leaches into the water creating a health hazard and harming people. This is not only unsubstantiated, it is completely incorrect, and is a blatant and intentional attempt to create “fear” designed to mislead consumers into thinking there is something dangerous about mesh plates.

Let us address each issue:

First, if you spend the time to research titanium you will find that it is not harmful to the human body. According to Wikipedia: “Titanium is *biocompatible*” (meaning non-toxic and is not rejected by the body). Titanium is used in a gamut of medical / dental applications including surgical implements and implants, such as hip balls and sockets (joint replacement) that can stay in place [in the human body] for up to 20 years.

Titanium is non-toxic even in large doses and does not play any natural role inside the human body” (emphasis added). In addition, many health resources list titanium as a trace element. A trace element is something that has unquantifiable useful benefit to the human body and health. So clearly the first point is made that Titanium is not harmful to human health (even in large doses).

Next it is important to note that this false notion of Titanium toxicity is based on hyperbole; with no back up what so ever. **Emco Tech plates do not leach even a measurable amount of titanium.** To substantiate this fact, please refer to Addendum 1. This is a certified analytical test result from the United States Environmental Protection Agency Primacy Laboratory for the State of Nevada run by the University of Nevada at Reno Medical School. A USEPA Primacy Lab is the accrediting body for all EPA certified labs in any given state. The results show that there is a less than detectable amount of titanium in the water produced by the IonWays Athena, which uses the same materials as in other Emco Tech plates.

Additional research will show how unfounded, misleading and incorrect this approach is. Titanium DOES NOT dissociate in low voltage electrolysis given the following facts: it is electrically nonconductive, it registers a 6.0 on the MOHS scale making it is extremely hard, and it is also very corrosion resistant. Specifically Wikipedia states: "Titanium burns in air when heated to 1200 °C (2,200 °F)" and is very un-reactive with water". Also from Wiki: "while titanium is thermodynamically a very reactive metal, it is slow to react with water and air". If Titanium will only react under extreme stress as Wiki points out, then the amount of power applied to an electrode or plate would be a crucial factor in any leaching. If it were dangerous, and were capable of leaching, titanium would be much more likely to leach under a high electrical load (stress). Interestingly Emco Tech units employ approximately 1/3 the watts and amps compared to our larger plate competitors. Emco Tech units apply 85W and 1A - a much more efficient and environmentally friendly way to ionize.

Water cell Technology

Some of our competitors make much of the size of their water cell and electrodes. They have chosen to take a misleading approach in a direct attempt to justify an overinflated price. The water cell is the heart or engine of any ionizer and consists of a series of electrodes or plates, each separated by a membrane. The number of plates in a cell varies from a low of three up to seven. It is important to understand the electrode and its functional properties if you truly want to understand ionization technology and make an informed choice.

Physical plate manufacturing design includes three basic types. The most common, yet basic type, is a simple flat design. Secondly, there are at least two units on the market that utilize a slotted arrangement that is a cheaper and less effective version of mesh. Lastly there is the more expensive to manufacture and technically evolved mesh configuration.

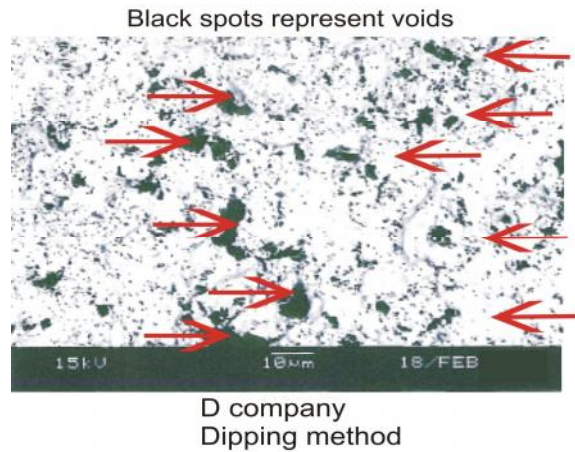
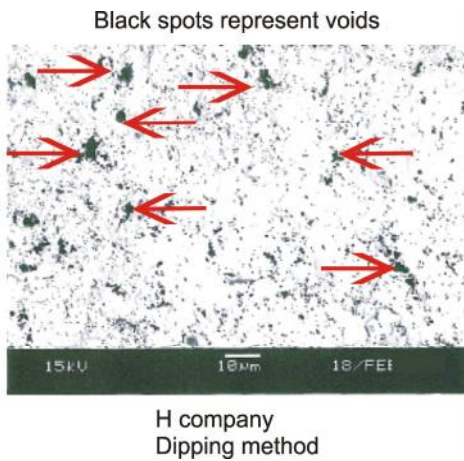
Titanium is used as the base material in all the electrodes on the market today. It is corrosion resistant, has the highest strength-to-weight ratio of any metal and is very durable. It demonstrates the ability to easily change polarity (to be used as both positive and negative pole) and that is crucial. This unique group of properties make it is the ideal material to use in electrolysis water ionizers.

In 1992, The Japanese Ministry of Health, Labor and Welfare formed a committee with the directive of examining water ionizers to investigate their safety and real useful capacities. The committee spent approximately \$2,900,000 in government money. Their long-term R&D findings showed that materials other than platinum are not safe for use in water ionizer plating. In addition to its safety characteristics, platinum is used because it is highly conductive. To our knowledge, the composition of the electrodes used in the industry today is all platinum coated titanium.

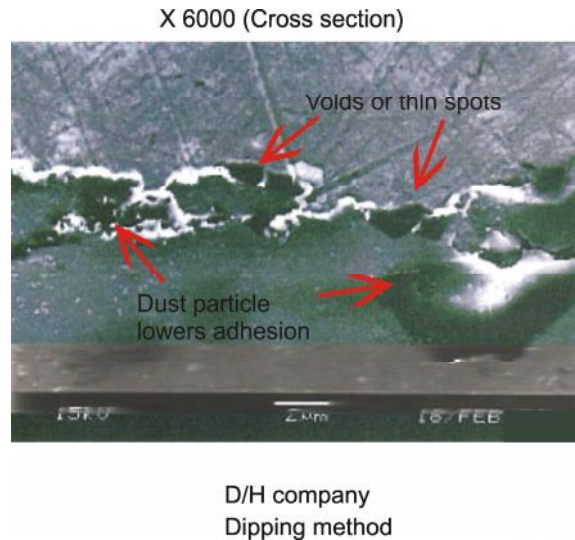
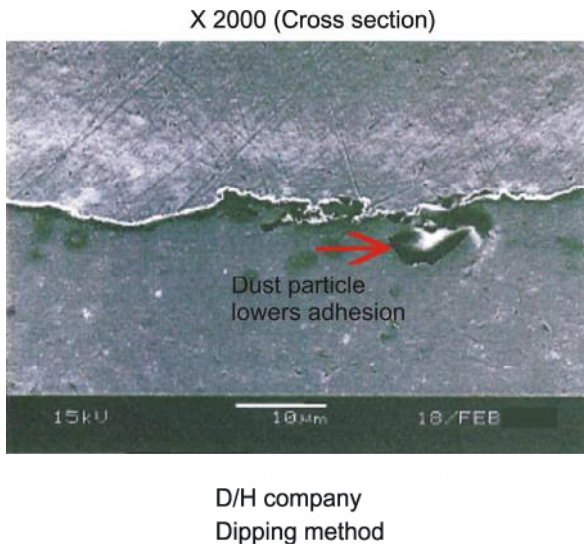
There are essentially two methods employed in the industry today to apply the platinum surface to the titanium: 'plating' (also known as cladding or dipping) and 'coating'. 'Plating' quite literally involves "dipping" a plate into a platinum solution; what adheres to the titanium becomes the plating. 'Coating' is the technique employed by Emco Tech. This is a technically advanced form of spraying known as 'electroplating' and is achieved by spraying an electrically charged solution with a computer controlled robotic arm under pressure multiple times.

Most companies that manufacture electrode technology today still plate or "dip" their electrodes. It should be pointed out that most ionizer companies do not make their own plates - they source them. The competitors who claim our plates leach titanium makes much of the fact that their plates are dipped. They also make much of the fact that Emco Tech does not, implying that they somehow have an advantage. Plating techniques to coat electrodes were employed by Emco Tech up until the late 1990's. In fact the dipping technique is an older, less technically advanced and less expensive way to coat plates. It is not an advantage – except in terms of manufacturing setup and cost. In fact it has some distinct disadvantages.

Research (and common sense) show that dipping (or "cladding") results in inconsistencies of thickness and/or "thick and thin" spots, and even worse – voids. Voids are exposed spots where no platinum coats the titanium. Dipping also allows for dust particles to be present which further add inconsistency to the surface thickness, uniformity and therefore the ability of the plate to effectively conduct current. The ability of a plate to create proper alteration in the water is based on electrolytic efficiency. The following examples visually illustrate these issues on dipped plates. The first two images are scanning microscope views of a plate surface from above:



The two images below are a cross-section of the same platinum surface showing both dust and voids presented in two different levels of magnification:



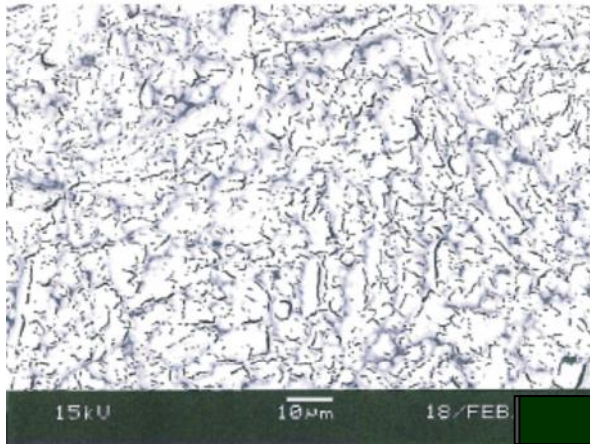
Emco Tech R&D in Japan has developed and perfected a more sophisticated and effective coating process. Emco Tech's proprietary process involves some notable advances that produce:

- 1) Superior platinum adhesion
- 2) Superior conductivity
- 3) Increased surface area from up to 3x the number of vertices as smooth "hot dipped" plates
- 4) Optimized water flow dynamics over the plate surface due to vertices (increasing ORP production – proven in independent US EPA certified testing)

The process of electroplating involves applying the platinum coating by robotically spraying the mesh electrode surface three times under pressure from three angles with a solution containing pure platinum ions and then passing an electric current through the solution, which causes the ions to adhere to the titanium. This creates an extremely uniform surface with NO thick or thin spots or voids which are common in the less sophisticated hot dipping process. The differences in techniques would not be unlike

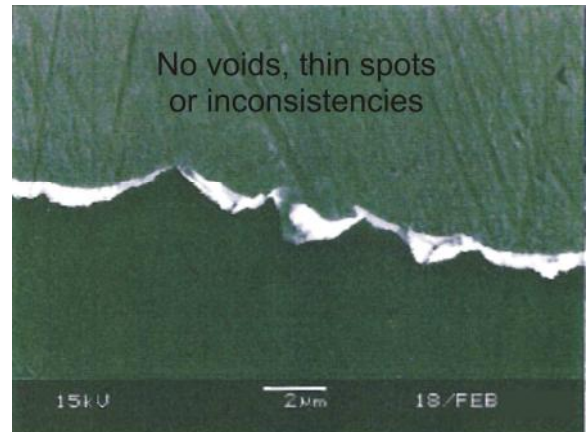
comparing dipping a car in paint or having it sprayed robotically using very precisely controlled variables and under controlled conditions. The images below illustrate that there are no thick or thin spots and definitely no voids. There are also more pronounced and noticeable vertices on the surface.

No voids, thin spots
or inconsistencies



Emco Tech plate

No voids, thin spots
or inconsistencies



Emco Tech plate
(coated platinum)

There are functional differences between plating and coating that result in more or less effectiveness electrolytically. If you look at an Emco Tech Mesh Diode Electrode at 700x magnification you will see distinct vertices or peaks and valleys. Compared to the platinum plated or smooth electrodes with only one layer, the coated platinum with 3 layers of crystals has many more crystal vertices.

When a cross section of an Emco electrode is examined at magnification, you can see that the electrodes have very sharp points and form distinct peaks and valleys. If you feel the surface with your finger it would feel rough, like a gritty sand paper (about 120 grit sandpaper feel). This 3-dimensional crystalline surface increases the effective electrolytic surface area and also provides for improved water flow dynamics over the plate. Both of these are important performance characteristics in overall plate function.

Performance

Our competitors make much about how the number of plates or the size of the plates must instantly equal better performance. Our first response is to show our independent third party certified test results. This test was administered by a US EPA Certified Analytical Lab and substantiates our superior performance. See the certified results in Addendum 2 or you can view them at http://ionways.com/resources_videos_3.aspx These tests were performed to the US EPA certified labs protocols. Anthony Francis PhD, the Silver State Lab Director, details the test protocols in the video. The results

speak for themselves. As far as we know these are the only certified and independent laboratory tests done by any ionizer company in the USA.

The number or size of plates does not determine the performance of a given ionizer, any more than you would expect the simple size of an engine would determine the performance of a vehicle. With vehicle performance, you would consider the factors internal to the engine such as materials used, torque, horsepower and gearing etc. There are external variables that would also affect performance such as the size and weight of the vehicle, its function etc. For example, the same 4.9 liter Ford used in the Mustang and the F-150 truck would produce two different results.

Similarly with ionizers there are internal and external performance variables that affect the performance of an ionizer. A crucial external variable would be the dissolved mineral content of the source water - referred to as TDS. TDS creates the pathway for the electrical current to create "ionization" (or more correctly electrolysis). This variable is the most crucial to performance. Tap waters vary widely in the dissolved mineral content. The higher the mineral content ("harder" the water) the higher the levels of pH and ORP alteration an ionizer can achieve; the lower the mineral content ("softer" the water) the lower levels of pH and ORP alteration. Water without mineral content (like reverse osmosis or distilled water) has no conductivity and therefore can not be "ionized". The importance of this variable cannot be emphasized enough.

The primary internal variables would be flow rate of the water through the cell and electrical value applied to each plate. The flow rate through the machine determines **how long** the water is actually in contact with the electrodes receiving the voltage and the effects of electrolysis. If your flow is fast (say you could fill a quart or liter in 15 seconds) then the water is not processing very long and not receiving much alteration. Conversely, with a slow the flow rate (say the same quart or liter took 60 seconds) the water is in the chamber in contact with the electrodes longer and will receive more alteration. You can *always* achieve higher pH and ORP readings with reduced flow rates.

The electrodes deliver the current and create the "ionization". A customer controls the voltage by selecting the different "Alkaline" settings. The higher the Alkaline setting (or voltage), the more alteration you will achieve in pH and ORP. Every ionizer has a maximum power setting which will give the highest performance. However the amount of power applied to the plates must be considered in relationship to plate size. Applying Ohm's law, the power to plate relationship would be expressed this way:

All the ionizers on the market in the USA would have an input voltage of 120VAC,

Example using Enagic™: The square area of the plates is acquired by 4.75" x 7" x 2 sides x 7 plates = 465.5 in².

$$465.5 \text{ in}^2 / 120\text{v} = 3.88\text{v}/\text{in}^2$$

$$465.5 \text{ in}^2 / 240\text{W} = 1.94\text{W}/\text{in}^2$$

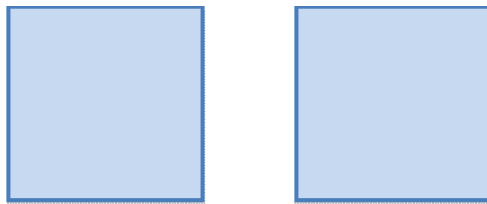
IonLife/IonWays: The square area of the plates is acquired by 3" x 5" x 2sides x 5 plates = 150 in².

$$150 \text{ in}^2 / 120\text{v} = 1.25\text{v}/\text{in}^2$$

$$150 \text{ in}^2 / 120\text{W} = 1.25\text{W}/\text{in}^2$$

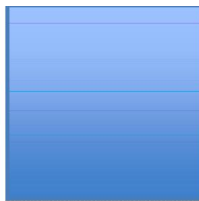
An easy way to illustrate the data Ohms law depicts above would be with the following visual representation using the coverage of one drop of blue ink over square area

The Enagic™ shows a drop of blue ink (Power) spread through 2 squares. Shown in *Img 1*.



Img 1: Enagic™ machine covering 2 squares with one drop of blue ink.

One drop of blue ink covers both blocks. The IonWays machine covers a drop of ink (Power) through one square. Shown in *Img 2*.



Img 2: IonLife machine covering ONE square with ONE drop of blue ink.

You also have to consider the efficiency of the plates – or their effective conductivity. This would equate to how much of the electrical power transmitted to the plate actually gets into the water to create the electrolytic effect. This is where the platinum surface of the plate (recall the differences) plays a role that cannot be under emphasized and where Emco Tech's manufacturing techniques distance them from the competition. The vertices created by their advanced electro-plating techniques create improved conductivity and water flow dynamics over the plate improving efficiency. Generally the larger electrodes made with older or less expensive and advanced manufacturing techniques have poorer conductivity – **so they *have to be larger***.

So you can begin to see that simple plate size is not the be -all-end-all to performance that many would like to you to believe. It is crafty marketing of less efficient and less powerful and advanced technology.

The last thing to consider in performance is performance over time. It is useless to have a highly performing electrolytic plate surface if you can not keep it clean from scale. Scale forms from scaling minerals sticking to surfaces and building up over time.

Cleaning – protecting electrode performance over time

The electrode's ability to deliver current to the water and create electrolysis can – and does - become compromised over time. Here is the situation: Water has minerals. Minerals will build up on the electrodes through repeated exposure. Mineral build up or scaling essentially “coats” the electrode, compromising its conductivity and consequently degrading the performance.

All ionizers have a cleaning system. Most certainly all ionizer cleaning systems are not created equal. The cleaning system in any ionizer is designed primarily to clean the electrodes and is based on a concept called “reverse polarity”. Each electrode has either a positive or negative polarity. Reverse polarity simply switches the charge applied to the electrode.

There are two parts to reverse polarity cleaning:

- 1) A reversal of the polarity on the electrodes which repels any thing that is sticking.
- 2) A washing or “bathing” of the electrodes in acidic water – the only effective way to clean scale

There are significant differences that determine how effective the cleaning cycle really is. One key difference is how much time the cleaning cycle runs in comparison to how much time the ionizer runs making alkaline water - the “acidic to alkaline cleaning ratio”. One popular and expensive brand cleans approximately 30 seconds for every 10 minutes of alkaline production time. It is crucial that an ionizer has a good acidic to alkaline cleaning ratio. The more acidic water is run to bathe the electrodes the better.

The way an ionizer is “programmed” to clean is also crucial in determining the cleaning ratio. Some units clean each time you start water flow (you must either wait or override the cycle). Some units operate on a timer system that initiates cleaning on an interval such as every 12 hours. Some are set to trigger cleaning after a set volume of water passes through the ionizer. Some even require manual cleaning, where the user has to initiate cleaning. Each has its draw backs: you can forget to trigger a manual cycle, you have to wait or override a pre-use cycle, the timer based systems and in fact all these systems have poor acidic to alkaline cleaning ratios. The final drawback is that with each of the above systems you have to wait for the cycle to complete before the user can receive alkaline drinking water.

The cleaning cycle in the Emco Tech Melody (for example) is clearly a cut above other brands on the market. The Melody employs an Automatic Self Cleaning mechanism - meaning it cleans *automatically each and every use*. It literally switches polarity each

time you use it. This provides an optimal acidic to alkaline cleaning ratio – literally a 1:1 ratio. Additionally, with its Patented Reversible Chamber you never have to wait to get your alkaline water (the cleaning happens in the background).

Additional Facts We Think You Should Consider:

1. Emco units have more safety certifications than our competitors including specifically RoHS – which is hazardous materials certification (<http://www.rohs.gov.uk/>) "The RoHS Directive stands for "the restriction of the use of certain hazardous substances in electrical and electronic equipment".
2. The entire industry uses Titanium – if there were any reason or chance that electrolysis using Titanium plates would leach harmful amounts both the Japanese and Korean governments, would shut it down. They have both demonstrated historically that they will step in and institute controls within the industry.
3. One competitor purports that the platinum is applied to the plate to keep Titanium from leaching which is bogus information. This underscores their lack of understanding regarding the technology. The platinum is used because of its highly effective conductivity.
4. Emco Tech has been supplying water cell technology to the Tennant Company's (<http://tennantco.com>) "ech2o Project". Using our water cells, the Tennant Co. developed a commercial floor cleaning machine that uses electrically activated water (ionized water) to replace chemical surfactants and detergents. As a very large and sophisticated technology company, Tennant did exhaustive research on the ionization industry before proceeding with the R&D to develop ech2o. This process validated ionization technology in general and provided due diligence on the industry players from which they selected an ionization technology partner to source water cell technology. Emco Tech was selected and continues to supply the water cell technology three years after ech2o launch. In 2009, Tennant won the coveted European Business Award for the Business Innovation of the Year.

You have now seen accurate information about plating technology and manufacturing processes, seen some examples that illustrate the information reviewed, and test results to back it all up. You can certainly see the conclusion the professional scientists at Tennant arrived at. In the end, other reps HAVE to say something to justify the over inflated price tags or gain traction with new untested models. So they draft non-objective documents, perform and post on the internet questionable testing, and make statements that look convincing and prey on fears. They completely lack any real documentation or science. The real proof is in the science and the results.

The truth is that Emco Tech is the largest manufacturer of electrode technology, leads the technical evolution of plating technology and cleaning systems and has been a major player in the industry for over 25 years. The facts speak for themselves.



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WATER CHEMISTRY REPORT
STATUS: REVISED FINAL

Report To:

ATTN: JOE STUMPH, GEOFFE POOLE
ION WAYS
8745 TECHNOLOGY WAY #C
RENO, NV 89521

Accession Number: 217243
Sampled By: JOSEPH STUMPH
Date/Time Collected: 06/12/09 11:53
Date/Time Received: 06/12/09 12:18
Report Date: 06/17/09
Original Report Date: 06/17/09

Analysis Type: SDWA
General Location: ATHENA, JP 205 1,2,3
Source Address: 8745 TECHNOLOGY WY. #C
City: RENO
State: NV
County: WASHOE

PWS ID:
Public Water System:

Township: Range: Section:
 For Compliance
 Not For Compliance
 Not Indicated

Test	Method	Results	RI	MCL	Analysis Date	Analyst
Platinum	EPA 200.8	<1 ug/L			06/15/09	SRice
Titanium	EPA 200.8	<1 ug/L	1		06/15/09	SRice

FOR LAB USE ONLY:

EPM: 0.0000 LSI: -9.30 Calc TDS: 0 SAR: 0.0000 TDS/EC: 0.00

Approved By

Date

P = Pending Result
RL = Reporting Limit
MCL = Maximum Contaminant Level
ND = Not Detected

NOTE: Results displayed in BOLD, ITALIC TYPE have failed Nevada State health standards

NOTE: This document will be destroyed at NSHL after 12 years, unless Client requests otherwise.



LABORATORY REPORT

DATE: July 11, 2008

REPORT NUMBER: 08-2278

CLIENT: IonWays
8745 Technology Way, Ste C
Reno, NV 89521

PAGE: 1 of 2

CLIENT PROJECT:

Sampled By: T. Bills
Date Sampled: Refer to COC
Time Sampled: Refer to COC

Submitted by: T. Bills
Date Received: Refer to COC
Time Received: Refer to COC

Report Attention: Jay Hare

Tap Water:

System	Highest Alkaline pH (S.U.)	Highest Alkaline ORP (mV)	Acidic Drinking Spout pH (S.U.)	Acidic Discharge Spout pH (S.U.)
Retin-cyan: MMP-5050	9.14	-146.2	6.57	
Leionizer 5000N	9.95	-763.5	6.70	
KYK 9040 Harmony	9.48	-482.0	6.24	
Ionways Melody	10.47	-637.1	6.51	
Ionways Athena	10.54	-812.0	3.28	2.88
Enagic leveluk SD 501	9.46	-578.7	6.38	5.81

REVIEWED BY:

Anthony W. Francis, Ph.D.
Project Manager